

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:  
DAVID PAUL MILLER et al

Serial No.: 10/757,624

Filed: January 28, 2004

For: IMPROVED PROCESS FOR  
PRODUCTION OF GYPSUM/FIBER  
BOARD

Examiner: PATRICK BUTLER

Art Unit: 1732

)  
I hereby certify that this correspondence is  
being deposited with the United States  
Postal Service as first class mail in an  
envelope addressed to: Commissioner of  
Patents and Trademarks, Washington,  
D.C., 20231, on January 23, 2007.  
)  
)  
)  
)  
)  
Date: Jan 23, 2007  
)

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**DECLARATION OF PAUL J. HENKELS**

Being duly warned, PAUL J. HENKELS declares as follows:

1. I am an adult citizen of the United States.
2. I received a BS in Engineering from the University of Illinois in 1983, an MS in Engineering from the University of Illinois in 1984 and a Masters in Engineering Management from Northwestern University in 1992.
3. I have been continuously employed by United States Gypsum Company (USG) since 1984. I worked in the USG's Research and Technology Department from 1984 – 1997 and have worked in the Manufacturing Technical Services Department since then. My present title is Manager of Technical

Services Department since then. My present title is Manager of Technical Manufacturing for the US Gypsum Company. For the last 16 years I have been mainly involved in engineering of processes to calcine gypsum for wallboard, industrial and construction plasters. These processes form various calcium sulfate crystals such as alpha calcium sulfate hemihydrate crystals and calcium sulfate anhydrite crystals. Many of these processes involve the use of crystal modifiers.

4. I have published several papers involving calcium sulfate crystallization, specifically papers on the recovery of synthetic gypsum crystals from power plant flue gas desulphurization (FGD) processes including "Characterizing Synthetic Gypsum for Wallboard Manufacture" in 1995 for presentation at the annual American Chemical Society meeting; "FGD Synthetic Gypsum Quality and Supply Issues" published in American Coal Ash Association's Ash at Work trade magazine in 2004 and "Gypsum Plasters and Wallboards" published in the 7<sup>th</sup> Edition of Industrial Minerals and Rocks Encyclopedia in 2006 by the Society for Mining, Metallurgy and Exploration, Inc.

5. Through my work, I am familiar with the process described and claimed in US Patent 5,320,677 to Baig and products described therein. I am also familiar with the invention described and claimed in the above-identified Miller et al patent application.

6. I have reviewed the specification and pending claims of the above-identified Miller et al patent application. I have reviewed the Office Action dated August 23, 2006. I have also reviewed US Patent 5,320,677 to Baig and US Patent 3,835,219 to Jaunarajs et al cited in the Office Action.

7. The only mention of crystal modifiers in Baig occurs at Col. 6, lines 42-45, where Baig states that "organic acids" can be added to the slurry can "to stimulate or retard crystallization or to lower the calcining temperature." One skilled in the art would not assume from the Baig statement that organic acids will increase the aspect ratio. One skilled in the art would not assume that organic acids even affect the aspect ratio of the hemihydrate crystals from the Baig statement.

8. Those skilled in the art of crystal formation know that "crystal modifiers" can affect three parameters, namely: the time required for crystal formation, the temperature at which the crystals are formed and the shape or morphology of the crystals that are formed. The morphology of the crystals includes the lattice symmetry, optical orientation, water of crystallization, density, hardness and a host of other parameters, in addition to aspect ratio. It would not be obvious to one skilled in the art to use modifier known to affect the time or temperature of crystal formation of calcium sulfate anhydrite crystal as a modifier to increase the aspect ratio of calcium sulfate anhydrite crystals.

9. Persons skilled in the art understand that most crystal modifiers that impact on the aspect ratio of calcium sulfate crystals tend to produce short, blocky crystals having low aspect ratios. Those skilled in the art know that the longest crystals having high aspect ratios are produced from pure aqueous suspensions containing no contaminating reagents. Accordingly, one skilled in the art would assume any crystal modifier added to a calcium sulfate crystallization process would produce shorter blockier calcium sulfate crystals, not crystals having increased aspect ratios.

10. It is well known to those skilled in the art that "organic acids" (such as those mentioned in the Baig Patent) and their salts cause the formation of short blocky crystals (low aspect ratio) of calcium sulfate hemihydrate in crystallization processes. See for example U.S. Patent 2,448,218 (1948) to Haddon.

11. US Patent 3,835,219 to Jaunarajs et al is directed to a batch method of preparing fibrous soluble calcium sulfate anhydrite crystals in an aqueous suspension. US Patent 3,835,219 to Jaunarajs et al is not directed to a continuous production of calcium sulfate hemihydrate crystals from a composite aqueous system containing cellulosic fiber. Those skilled in the art of gypsum crystal formation know that organic impurities contained in the cellulosic fibers in the aqueous calcination system often cause the formation of short blocky calcium sulfate hemihydrate crystals.

12. US Patent 3,835,219 to Jaunarajs et al is directed to preparing fibrous soluble calcium sulfate anhydrite crystals having an aspect ratio between 10:1 and 100:1. The only statement in Jaunarajs et al about crystal modifier function is: "The suspension may also contain a small amount of a crystal habit modifier which is suitable for the formation of the fibrous soluble anhydrite. These are generally acids such as boric, succinic, adipic, malonic, sebacic, and similar acids or their salts, as well as salts such as sodium chloride, sodium sulfate, aluminum sulfate, and zinc sulfate." (See Col. 3 lines 10-19) The Jaunarajs et al patent does not suggest to one skilled in the art that any of the enumerated modifiers will increase the aspect ratio of the crystals being formed as claimed by Miller et al.

13. Jaunarajs et al provides 4 examples to illustrate the formation of fibrous soluble calcium sulfate anhydrite crystals. Examples 1 and 2 include boric acid (the preferred crystal habit modifier – See Col. 2, line 16) while Examples 3 and 4 use no crystal habit modifier. The aspect ratios of the crystals produced with the crystal habit modifier (Examples 1 & 2) were lower than the aspect ratio of the crystals produced with no modifier (Examples 3 & 4). Thus Jaunarajs et al actually teaches that the enumerated modifiers produce shorter, blocky calcium sulfate anhydrite crystals, not higher aspect ratio crystals as claimed by Miller et al.

14. Those skilled in the art are aware that the organic acids disclosed in Jaunarajs et al are commonly used as crystal modifiers, but to force the aspect ratio to shorter and blockier crystals instead of the higher aspect ratio crystals sought by applicants Miller et al. The use of organic acids to produce crystals of low aspect ratios are common in power plant recrystallization of calcium sulfite/sulfate to produce larger, blockier crystals that are easier to dewater in their water reclaim process.

15. Jaunarajs et al does not mention using aluminum chloride or chlorine (required by claims 5 - 8 of the Miller et al application) as crystal modifiers or for any other purpose, although sodium chloride is listed as one of the crystal habit modifiers. If one skilled in art were to assume that any source of chloride would affect the aspect ratio of calcium sulfate hemihydrate crystals, calcium chloride should have an effect similar to the effect as sodium chloride. However, those skilled in the art know that calcium chloride has been used as modifier to produce the shorter, blockier (lower consistency or water demand) calcium sulfate hemihydrate crystal. (e.g. See US Patent 2,616,789 Column 16, line 29-40). Accordingly, the prior art shows those skilled in the art that aluminum chloride and chlorine would produce a shorter, blockier calcium sulfate hemihydrate crystal, not the increased aspect ratio crystal required by claims 5 - 8 of the Miller et al application.

16. Jaunarajs et al like Baig fails to suggest that the specifically disclosed "crystal habit modifiers" have any impact on the aspect ratio of any type of calcium sulfate fibers. Clearly, both prior art references fail to teach any crystal modifier that will produce a calcium sulfate hemihydrate crystal having an increased aspect ratio. Accordingly, it would not be obvious to one skilled in the art to try to use the crystal modifiers described in the prior art references to increase the aspect ratio of the calcium sulfate hemihydrate crystal being produced by the Baig process as described and claimed in the above-identified Miller et al application.

Further Declarant sayeth naught.

Warning

All statements made herein as of my own knowledge are true and all statements made herein as on information and belief are believed to be true. Declarant acknowledges that he has been warned that willful false statements and the like are punishable by fine or imprisonment or both (18 USC 1001) and may jeopardize the validity of the application or document or any patent resulting therefrom.



PAUL J. HENKELS

January 5, 2007